March 13, 1934. J. A. PROCTOR 1,950,515

MASTER SWITCH

Filed May 11, 1928 3 Sheets-Sheet 1

Fig. 1.

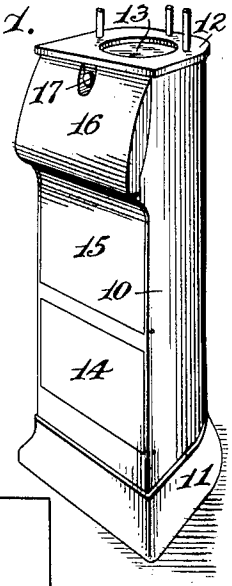


Fig. 2.

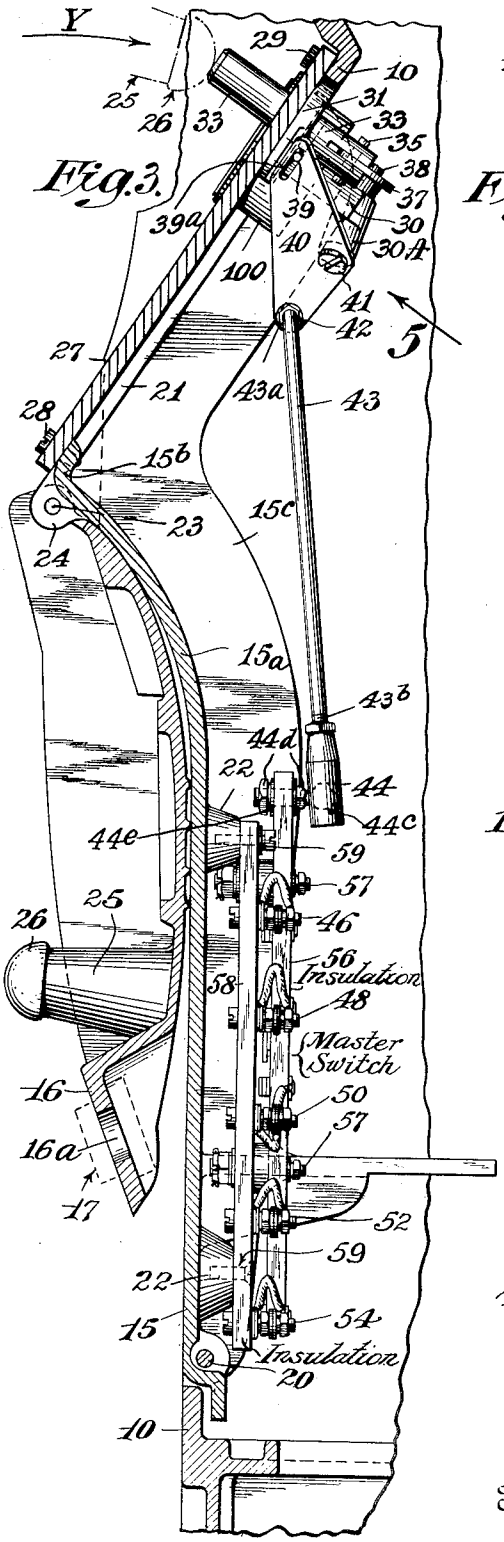
Inventor:
John A. Proctor

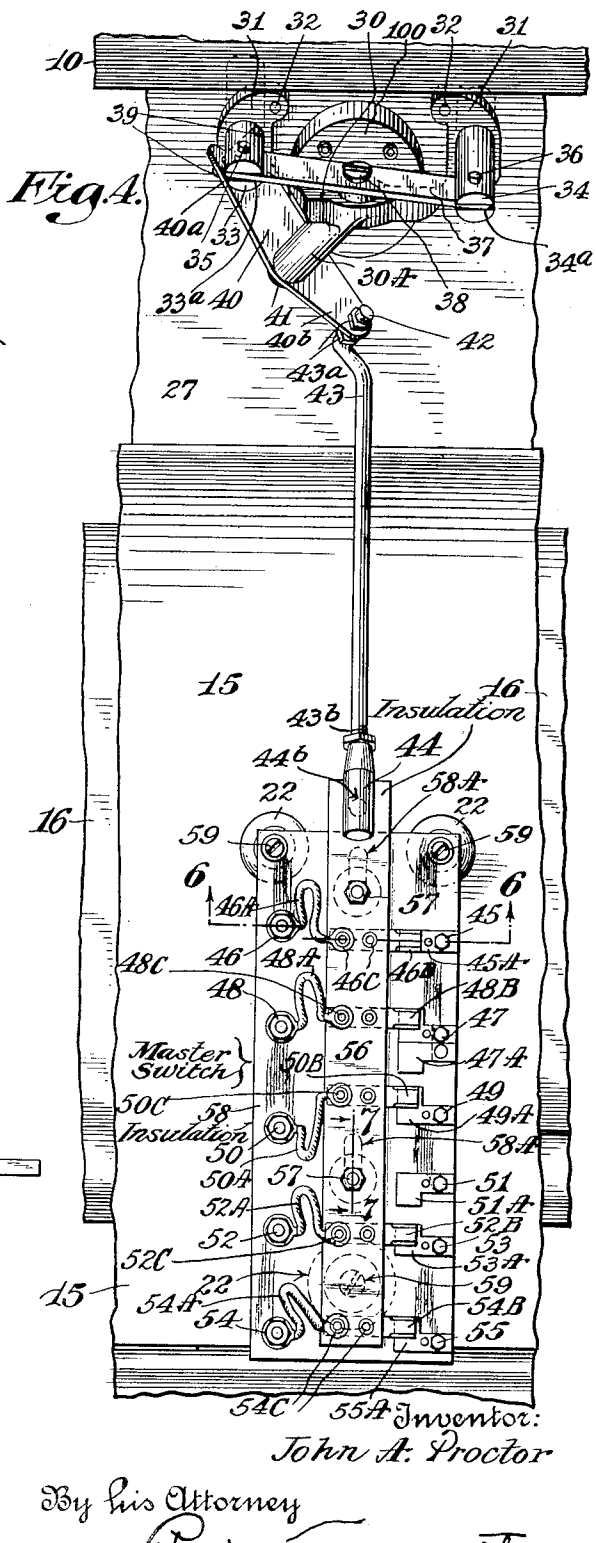
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MASTER SWITCH

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Inventor:
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MASTER SWITCH

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Fig. 5.

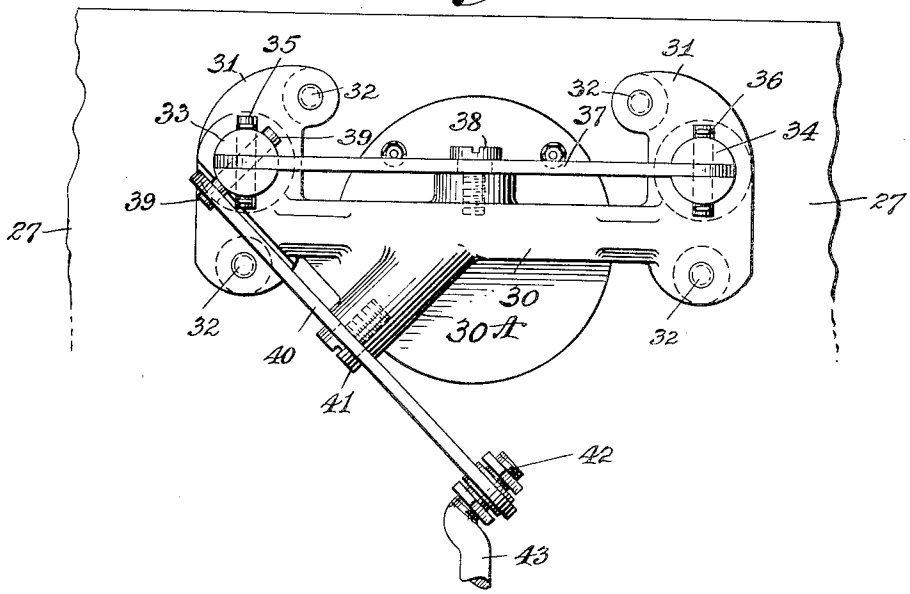


Fig. 6.

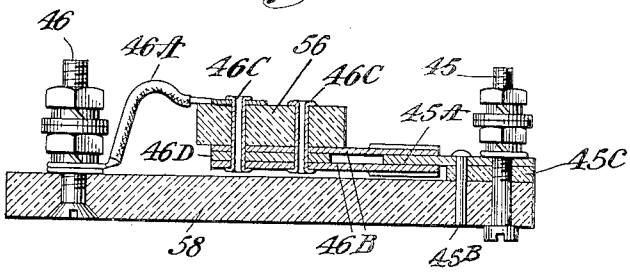
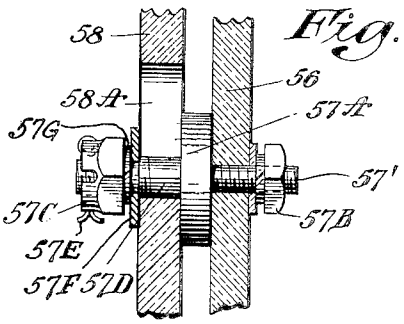


Fig. 7.



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Patented Mar. 13, 1934 1,950,515

UNITED STATES PATENT OFFICE

1,950,515

MASTER SWITCH

John A. Proctor, Lexington, Mass., assignor, by mesne assignments, to General Electric Company, a corporation of New York

Application May 11, 1928, Serial No. 277,027

13 Claims. (Cl. 200—54)

This invention relates to a radio compass for finding the bearing of a transmitting station such as a radio beacon or a sending ship, and more particularly to a novel switching mechanism for such a device.

Hitherto, in the operation of known types of radio direction finders, it has been customary to manually operate the several switching mechanisms required as separate and distinct devices. Such manual operations is tedious, involving a considerable expenditure of time on the part of the operator, and requiring a high degree of skill and care in order to assure competent operation. A further disadvantage resides in the fact that, due to carelessness or stress of work, one or more switches may not be properly manipulated, or may even be left in their operative positions when the direction finder is not in use. This latter condition results in a considerable waste of electrical energy from the batteries, which are normally used to supply the necessary current to the various parts, the waste of such current necessitating frequent servicing of the batteries and other parts.

It is an object of this invention to provide a switching mechanism which is semi-automatic in operation and which requires a minimum of manual control.

It is a further object of this invention to provide such a mechanism which is operated by the action of a main control.

Yet another object of this invention is the provision of a master switching mechanism which controls a plurality of current leads in a novel and improved manner.

Still another object of this invention is the provision of such an automatically operable master switching means in association with the electrical parts of a radio direction finder system.

These and other desirable objects and advantages will be described in the specification and illustrated in the accompanying drawings, a preferred embodiment being shown by way of illustration only, for since the underlying principles may be embodied in other specific mechanical structures, this invention is not to be restricted to the device shown, except as such restrictions are clearly imposed by the appended claims.

In the drawings, like numerals refer to similar parts throughout the several views, of which

Fig. 1 is a perspective view, in miniature, of a casing adapted to contain certain mechanisms of a radio direction finder;

Fig. 2 is a wiring diagram of the circuits used therein;

Fig. 3 is a vertical longitudinal fragmental section showing inside view of the upper front portion of the device shown in Fig. 1, showing the master switching means below and its control from above;

Fig. 4 is a rear elevation of the master switching means as a whole as viewed from the right of Fig. 3, showing the method of bridging the voltmeter;

Fig. 5 is a rear elevation of the control of the switch operating means, and the filament meter, on the panel above, as viewed from the direction indicated by the arrow "5" in Fig. 3;

Fig. 6 is a transverse section of the master switch itself, below the control, taken on line 6—6 of Fig. 4; and

Fig. 7 is a vertical fragmentary section of the switch as indicated on line 7—7 of Fig. 4.

The radio direction finder comprises a casing 10 adapted to house the operating parts of the electrical system and the necessary batteries. The casing is adjustably mounted in a base casting 11, by suitable means, not shown, the specific structure and its associated parts being disclosed and claimed in application Serial No. 277,026, filed May 11, 1928. The casing is provided with a top cover 12, in which is mounted a dummy compass or Sperry "repeater" 13, as more particularly set forth in the above-designated application.

Access to the interior of the casing is provided by doors 14 and 15, which close the battery compartment below at 14, and the intermediate instrument chamber above the battery compartment.

A cover 16, secured to the casing by any suitable locking means 17, is mounted on the door 15, and gives access to the operating panel 27 above the instrument chamber. The door 15 is mounted in the middle part of the casing 10, and is provided at bottom with a pintle 20, upon which it is adapted to rotate. This door is forwardly bowed, as shown at 15a, the so-formed curved portion being provided with an inwardly curved portion 15b, which serves as a bottom support for the operating panel. This door 15 is also provided at the rear side with integral stiffening ribs 15c, which conform generally to the sectional configuration of the door, and which are extended upwardly and inwardly at 15c to provide supports for the door-holding means, not shown.

The operating panel cover 16 rotates about a pintle 23 mounted in lugs 24, which project outwardly from the upper portion of door 15. This cover 16 is described in detail in the companion case above referred to, and only such details of

the construction will be set forth here as are involved in the operation of the master switching mechanism.

Referring now to Fig. 3, it will be noted that the cover 16 is apertured at 16*a* to receive the locking mechanism 17 above referred to, which may be any suitable device.

An elongated boss 25 is fastened to the cover 16 in any desired manner, and is shown as being cast integral therewith. This boss has a terminal portion 26, which may be of metal or of hard rubber, which portion is adapted to contact with the control button 33, in a manner to be described more in detail hereinafter.

The operating panel 27 is secured at its lower portion to the door 15 by means of a plurality of screws 28. At its upper portion it is secured to the casing 10 by means of knurled thumb screws 29. This operating panel 27 supports the master switching controls 33, 34 in addition to the other control mechanisms which are described and claimed in the application previously referred to. In order to open the door 15, the door 16 first is opened, and then top knurled thumb-screws 29 are removed from their positions supporting panel 27 to casing 10. Thereupon panel 27 and door 16 swing down on lower hinge of door 15 to casing 10 so as to expose to access the radio receiving instruments located inside casing 10 and carried by door 15 and panel 27.

The master switching control mechanism (operated by push-buttons 33, 34) is located on the upper rear part of the operating panel 27 directly behind the filament meter 100. This mechanism comprises a bridge-casting 30, the casting being provided with a pair of angularly disposed end extensions 31, provided with tap-holes 32, tapped to receive suitable fastening members to panel 27 and also provided with apertures for receiving the push button control members 33 and 34. This bridge casting is so conformed as to provide a recess into which the meter 100 is adapted to be received. This construction permits the meter to be fastened to the operating panel 27 and extend a substantial distance to the rear without in any way interfering with the operation of the master switching mechanism control linkage. The push button control members are slotted as shown at 33*a* and 34*a*, respectively, to receive the ends of lever arm or rocker 37, which is held in cooperative relationship therewith by means of pins 35 and 36. The rocker 37 is drilled at its center to receive the pivot screw member 38 which is supported in the bridge casting 30 and about which screw as a center the arm 37 is adapted to oscillate. A pin 39 is provided in push-button 33 and is adapted to operate in a slot 39*a* of a second rocker 40. This rocker 40 is somewhat angular in shape and is pivoted to casting 30 by means of a suitable screw 41 positioned at its apex. This screw 41 engages a projection 30*a* of member 30, which construction permits the rotation or oscillation of member 40 by the swinging of the front rocker 37 by push button 33 without interfering with their mutual operation. To the bottom of member 40, opposite slot 39*a*, the rod 43 is operatively connected by means of suitable nuts 43*a* which engage the threaded portion 42 of the rod, this portion being angularly disposed, as shown particularly in Figs. 4 and 5. The rod 43 is threaded at its lower end, as shown at 43*b*, to engage a ball and socket joint 44, which is apertured at 44*b* to provide for a studded ball 44*c*, which is positioned in the upper portion of the master switch member 56. This member 56 is preferably made of insulating material of suitable thickness and strength, the preferred substances for use therein being any of the well-known phenolic condensation products. The stud of 44*c* is adapted to engage a suitable aperture in the upper portion of the member 56, as has been noted, and is held firmly by means of opposed lock-nuts 44*d* acting against washers 44*e*.

The switch mechanism proper comprises a plurality of stationary contacts designated generally by the numerals 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55 and connected to the radio receiving apparatus on the back of door 15. These companion parts of the switching mechanism are mounted on a common stationary base 58, which is secured to the bosses 22 of the door 15 by means of suitable screws 59. It will be noted that this triangular support gives the maximum of strength with a minimum of parts and thereby facilitates installation and removal. The movable switch contacts 46*b*, 48*b*, 50*b*, 52*b* and 54*b* are secured to the movable master switch member 56 by a plurality of hollow rivets 46*c*, 48*c*, 50*c*, 52*c* and 54*c*, the left-hand members also engaging the terminals of pigtail connections 46*a*, 48*a*, 50*a*, 52*a* and 54*a* which are connected to the terminals 46, 48, 50, 52 and 54 by suitable screw connections. These pigtail connections are parts of the combinations shown in Figs. 6 and 7 and are involved with the arrangement which permits switch-carrying door 15 to be opened without interference with the master switching means.

Referring now to Fig. 6, which shows a cross-section of the contacts of the switch 46 (as an example of the various switches on insulating members 56, 58), it will be noted that this knife switch comprises a terminal member 46 on 58, pigtail connection 46A, hollow rivets 46C on 56, and contact members 46B movable by 56. These contact members are spaced apart by member 46D, the whole being held in mechanical and electrical relation to member 56 and terminal 46 by means of the hollow rivets above referred to. At the right-hand portion of this figure (Fig. 6) it is seen that these movable knife-blade contact members 46B of the switch engage opposite sides of the fixed switch contact 45A, which is electrically connected to terminal 45 on fixed insulator 58 and held in its fixed relation thereto by means of a rivet 45B, which passes thru member 45A, spacer 45C, and main base member 58. The terminal members 45 and 46 are provided with a plurality of washers and lock-nuts, whose number may be varied as desired.

The other switches on insulating bases 56, 58 are similar in construction to the one just described and are correspondingly numbered. As heretofore noted, the insulating member 56 is adapted to be moved vertically by means of rod 43 acting thru the universal joint 44. Member 58 is provided, as shown in Fig. 7, with a plurality of slots 58A, adapted to receive combination stud 57, which is threaded at both ends for a purpose now to be described.

The washer 57*a*, of any suitable construction, is fitted over the right-hand portion 57′ of the stud and is adapted to act as a spacer between the members 56 and 58. This spacer is secured to member 56 by means of the lock-nut assembly designated generally by the numeral 57*b*. The stud is provided with an enlarged shouldered portion 57*d* adapted for free movement in the slots 58*a* above referred to. This stud is suited to

receive the castellated nut 57c, which in turn is prevented from rotation by means of cotter pin 57e passing thru the stud. The washer 57f, whose external diameter is greater than that of the width of the slots 58a, and whose inner rim seats on the shoulder of 57D, is interposed between the end 57c and the base 58 and is frictionally held in contact by means of the spring washer 57g. It will now be noted that, with the provision of these features shown, member 56 is adapted for relatively short movement in a vertical plane only and is firmly held and prevented from lateral displacement. Thus the two vertical insulating members 56, 58 move together as a unit when door 15 and panel 27 are swung down on hinge 20; but they are arranged for relative vertical movement in parallel to one another when link 43 is moved vertically by either of push-buttons 33, 34.

When the cover 16 is closed, to move the master switch to "off" position, the knob 26 presses against push button 33, thereby actuating the link mechanisms 37 and 40, whereby the upper portion 40a (shown in Fig. 4) is depressed and the lower portion or link arm 40b is elevated, thereby raising the rod 43 and member 56 upwardly. The movable joint 44 between switch-member 56 and link 43, provides for vertical movement of 56 relative to 58, by rocker 40.

In the "on" position as shown in Fig. 4, the contacts register as follows:

46B with 45A
48B with 47A
50B with 49A
52B with 53A
54B with 55A

In the "off" position of the master switch, obtained by the above closing of cover 16 and pushing of button 33 and the consequent downward movement of link 43, the contacts register as follows:

46B broken with 45A
48B broken with 47A
50B made with 47A
52B made with 51A
54B broken with 55A

When the cover 16 is opened, there is no action thereby of the master switch, but the operator must depress the other push button 34 in order to operate the master switch to "on" position, the mechanical movement being the reverse of that described when the member 33 is depressed. By means of the construction just shown, it will be readily apparent that by a single movement of button 33 or button 34, the electrical circuits of the apparatus are simultaneously controlled and that when the device is not in use, the radio control and lighting circuits are automatically opened by the closing of door 16 and the A battery placed on trickle charge. The control and lighting circuits can be closed to "on" position of the master switch only when the navigator opens the cover 16 of the direction finder apparatus and depresses the single member 34, thereby throwing the master switch, with the result that the several blades thereof contact with their associated clips and the A battery is taken off trickle charge. When the service is discontinued, and panel 27 is covered and protected by the closing of cover 16, all the controls on the panel desirable to be put in non-service condition are so operated by the closing of said door and its pushing of button 33, regardless of the other controls which may be on panel 27 but independent of their mounted switch.

Referring now more particularly to Fig. 2, there is shown a schematic wiring diagram of a radio direction finder such as is described in application Serial No. 277,026, filed May 11, 1928, together with the circuits directly controlled by the master switch.

The radio direction finder circuits proper are shown in the upper portion of this figure and are briefly noted as follows:

The loop structure and its associated parts are designated generally by the numeral 100. Leads 101 connect the loop to a tuning condenser 102. The plate current of the system is controlled by a member 103 and the filament current by a member 104. A voltmeter 105 normally registers the filament or "A" voltage, and is adapted to register "B" voltage by means of double throw switch 106 (described in application Serial No. 277,026 filed May 11, 1928) cooperating with resistance 107.

A phase shifter 108 is arranged so as to permit antenna 109 to be coupled into the circuit through lead 110, to secure the desired cardiod effect, which is characteristic of radio direction finders of the type set forth in the application above referred to. It is to be noted that the antenna lead is shielded within the casing of the direction finder.

Telephone jacks 111 are connected in the proper circuits for the purpose of recording the received signals.

A push pull radio frequency amplifier unit, designated generally by numeral 112, and an oscillator unit 113, are connected to the radio circuit and to the "B" current supply in any suitable manner. The radio apparatus proper, or catacomb, is designated generally by the numeral 114, and will not be described here as its construction forms no part of the present invention, and is included in the drawings solely for the purpose of illustrating a complete operative unit in association with the master switching means described and claimed herein.

The circuits controlled by the master switch reading from the bottom up on member 58 are listed herewith in chart form:

Fixed clip	Movable clip	Circuit
"55"	"54"	Sperry repeater 115
"53"	"52"	−"A" current lead to set through relay 116
"51"	"52"	−"A" current lead to trickle charger 117.
"49"	"50"	±"A" current lead to set
"47"	"50"	110 V. D. C. current lead to trickle charger
"47"	"48"	110 V. D. C. lighting current to panel lamps 118
"45"	"46"	Radio room signal light (not shown)

It will now be seen that there has been provided a switching mechanism which controls a plurality of current leads in a novel and improved manner and which is semi-automatic in operation and is particularly adapted for use in controlling the electrical circuits of a radio direction finder.

As above disclosed, aside from the battery compartment 14 in the bottom of the casing, and the dummy compass at the top, the radio direction-finding instruments and circuits are located principally between the two, i. e., on the backs of the operating panel and door 19; the master-switch being also located on the back of the door but thereby below the panel, and the insulating base 58 for the plural switches lying in a vertical plane and also carried by the door 15. All those of the plurality of controlling switches for the apparatus which are desirably operated simultaneously are mounted on the vertical master

switch, a single linkage extends down to such master-switch from the panel above the switch, and the panel includes means whereby, when service is desired, a single operation by the navigator at the panel, operates all such switches on the vertical master base as by an upward movement of the vertical operating linkage 43. But the opening of the hinged panel-cover 16 cannot operate the master switch to operative position, with the result that such cover 16 can be opened and left open prior to service without starting operation of the direction-finding circuits; and can be left open during testing, and when door 15 has been swung open on its pivot 20. The above arrangements as to relations of panel 27 and master-switch 56, 58 on the back of door 15, and the connecting operating linkage 43, provide for distribution of desirable control by minimum number of parts distributed vertically in the front of the casing on the back of the door and/or the panel without interference with instruments and circuits, provide for short leads from the switches on master-base 58 to the instruments and circuits located in the same horizontal zone on the back of the movable front portion of casing 10, provide for the desirable location of the dummy compass at top above the circuits and instruments, and yet provide for a conveniently high location of the operating panel in a zone above a substantial proportion of the instruments and circuits, while yet the master control on the conveniently located panel 27 is connected to the instruments and circuits by way of the master-switch below and single vertically-extending linkage between the upper control and the lower master switch. And while, by way of such linkage 43, etc. in this construction, the navigator is required to operate the master-control manually at the panel 27 in preparation for service, yet his natural act of closing the cover 16 over the panel upon discontinuation of service, puts the master-switch 56, 58 in inoperative condition in respect of all the circuits desired for no-service condition, (not including those required to be adjusted during service), not only without complication of arrangements and disposition of the various elements, but actually in harmony with the above simple, compact and convenient combination. The panel-cover 16 and the master-switch-carrying cover 15 in this arrangement are in permanent rigid relation; the top curvature of cover 15 providing for the desirable inclination of the panel 27 facing the navigator as he stands facing the front of the direction-finder in normal service operation; and panel 27 being supported by the top of switch-carrying cover 15 at approximately the location where panel-cover 16 is hinged to switch-carrying cover 15. But while the switch-carrying cover 15 and panel 27 thus are secured together rigidly and permanently, yet when it is desired to gain access to the instruments and circuits inside the casing 10 and in rear of cover 15, the entire front of the casing, including panel-cover 16, panel 27, switch-carrying cover 15, master-switch-members 56 and 58, radio receiving apparatus and the operating linkage 43, etc., can be swung down on lower hinge 20, by swinging down cover 16 from panel 27 without any operation of master-switch 56, 58 thereby, but thereby exposing upper knurled thumbscrews 29 for removal so as to disconnect all said parts from the upper part of casing 10 in order to permit the desired outward swinging of all said parts, including 27 and 15, on the lower hinge 20. In said outward swinging of all the front parts including the master-switch 56, 58 and the radio receiving apparatus connected thereto, the above-described construction of the switch, Figs. 6—7, maintains rigidity of all the parts of the master-switch, from the push-buttons 33, 34 on panel 27, down to contact-carrying insulating master-switch-base 58 which is secured to the back of lower-hinged door 15. Such switch-rigidity conforms to the relative rigidity of panel 27 and door 15 in their outward swinging movements. All the switch-posts, as 46 and 45, Fig. 6, are mounted on insulating switch-base 58 which is fixed to door 15 and movable therewith. But from one set of such posts, Fig. 6, as 46, the pig-tails 46A lead to the switch-contacting members 46B carried by movable insulating switch-member 56. The vertical operating movements of member 56, caused by operating link 43, are permitted by such pig-tails and by the slotted construction of Fig. 7. Yet said Fig. 7 construction locks insulators 56 and 58 together in their parallel relations so that when door 15 and panel 27 are swung outwardly on lower pivot 20, switch-members 56 and 58 are kept in parallelism, and operating link 43 for vertically movable switch-member 56 swings outwardly as a unit with 56 and 58 and with door 15 without in any manner affecting the operative relations of the various switch-members but on the contrary maintaining the same in condition for normal switch-operation by link 43 whenever desired, as either for test, when door 15 has been swung open outwardly, or for service when door 15 is closed and only panel-cover 16 is open. In fact, even with door 15 swung outwardly open, so as to expose freely the radio receiving apparatus on the backs of 15 and 27, the entire apparatus can be operated for service, particularly when, with panel-cover 27 hanging down vertically from its pivot 24, the door 15 is not swung outwardly so far as to prevent convenient operation of the controls on the front of inclined panel 27. On account of the normal incline of panel 27, the door 15 can be opened wide enough to provide access to the radio receiving apparatus on its back, while yet the panel is not swung beyond a vertical position convenient for operation of its controls.

What is claimed is:

1. A switching arrangement for an encased radio direction-finder receiver comprising a casing housing said receiver; a door for the casing and hinged thereto at a lower portion of the door; an operating panel located above the door, fixed to an upper portion thereof and swinging outwardly therewith on said door-hinge; a switch secured to the back of the door below the panel and including a plurality of switches connected to circuits of the electrical apparatus; a master-control for said multiple switch and mounted on the panel; a panel-cover hinged to an upper portion of said door; and a vertically movable switch-operating linkage supported by the panel and extending downward from said master-control to the multiple switch; said multiple switch including a vertically extending insulating member by which it is secured to the back of the door and a second vertically extending insulating member secured to a lower portion of said downwardly extending operating linkage and also vertically movable; said vertical insulating members being secured together in their parallel relations and movable as a unit with the door, panel, panel-cover and switch-operating linkage when the door is swung on its hinge outwardly from the casing; and said master-con-

trol having a portion projecting out from the front of the panel in the path of a portion of the hinged panel-cover in the closing movement of the latter providing for operation of the master control and multiple switch by such movement of the panel cover.

2. A switching arrangement for encased radio receiving apparatus comprising a casing housing said apparatus, a door for the casing and hinged thereto for outward swinging therefrom; an operating panel suported by the door and swinging with it; a switch secured to the back of the door and including a plurality of switches connected to the circuits of the electrical apparatus; a master-control for said multiple switch and mounted on the panel; a panel-cover hinged to the hinged door; said multiple switch including two parallel insulating members of which one is second to the back of the hinged door and the second is movable relative to the first for circuit-controlling operation; and a switch-operating linkage extending from the master-control to said movable insulating switch-member; said two parallel insulating switch-members being secured together maintaining their parallel relations and movable as a unit when the hinged door is swung outwardly from the casing; and said master-control on the panel having an actuating portion projecting out from the front of the panel in the path of a portion of the hinged panel-cover in the closing movement of the latter.

3. A switching arrangement for an encased radio direction-finder receiver comprising a casing housing said receiver, a vertical door for a vertical wall of the casing and hinged thereto for swinging outwardly of the casing, an operating panel supported by the door and swinging with it, a switch secured to the back of the door and including a plurality of switches connected to the circuits of the electrical apparatus; a master-control for said multiple switch and mounted on the panel; said multiple switch including two parallel insulating bases arranged in general parallelism with the vertical door, one of said bases being the means thru which the switch is secured to the door, and the second of said bases being movable relative to the first; a switch-operating linkage extending vertically between the master-control on the panel and said vertically movable switch-member; and means holding said insulating switch members in their parallel relations, whereby the movable insulating switch-member is operatively movable relative to the other by said master-control on the panel and by said linkage between the master-control and switch when the casing-door is in either closed or open position on its hinge.

4. A switching arrangement for an encased radio direction finder receiver comprising a casing to house said receiver, a panel associated with said receiver and provided with a plurality of circuit terminals, means to rigidly secure the panel to the casing, a vertically movable member connected to certain of said terminals and means to move said member into operative engagement with the other of said terminals comprising a door, a lever and direction changing mechanism secured to the casing and connected to the vertically movable member, and operable upon closing movement of said door to displace said movable member to close connections between certain of said terminals.

5. A switching arrangement for encased radio receiving apparatus comprising a casing housing said apparatus, a door for the casing and hinged thereto for outward swinging therefrom, an operating panel supported by the door and swinging with it, a switch secured to the back of the door and connected to the circuits of the electrical apparatus; a control for said switch and mounted on the panel; said switch including two parallel insulating bases arranged in general parallelism with the door, one of said bases being the means by which the switch is secured to the door, and the second of said bases being operatively movable in parallelism with the first; a switch-operating linkage extending between the control on the panel and said movable insulating switch-base; and means maintaining the parallel relations of said insulating bases while the casing-door is closed and while it is in open position on its hinge, whereby the switch can be operated by the control on the panel and by said operating linkage when the door is either closed or open.

6. A switching arrangement for encased radio receiving apparatus comprising a casing housing said apparatus, a door for the casing and hinged thereto, an operating panel supported by the door and swinging with it, a switch secured to the back of the door and connected with the circuits of the electrical apparatus; a control for the switch and mounted on the panel; said switch including two parallel insulating bases arranged in general parallelism with the door, one of said bases being the means by which the switch is secured to the door, and the second of said bases being operatively movable in parallelism with the first; a switch-operating linkage extending between the control on the panel and said movable insulating switch-base; two binding-posts mounted on one of said insulating bases; vertically cooperating switch-contacts respectively mounted on the respectively relatively stationary and movable insulating bases; flexible connections between the respective switch-contacts and binding-posts; and means holding said insulating bases in their parallel relations both while the second base is stationary and while it is being moved by said control and operating linkage and while the door either is closed or is open on its hinge.

7. A switching arrangement for encased radio receiving apparatus comprising a casing housing said apparatus, a door for the casing and hinged thereto, an operating panel supported by the door and swinging with it, a switch secured to the door and including a plurality of switches connected to the circuits of the radio receiving apparatus; a master-control for said multiple switch and mounted on the panel; a panel-cover hinged to the hinged door; an operating linkage extending between the master control on the panel and the movable member of the multiple switch on the door; the master control including an operating device manually movable in one direction operating the operating linkage putting the multiple switch in "on" position; said operating device extending to the exterior of the panel and lying in the path of a portion of the hinged panel-cover in its closing movement over the panel for operation of the operating device in another direction operating the operating linkage putting the multiple switch in "off" position; and means maintaining the cooperating switch members in cooperative relations while the hinged door either is closed or is open on its hinge.

8. A switching arrangement for encased radio receiving apparatus comprising a casing housing said apparatus, an operating panel supported by the casing, a switch also supported by the casing

and including a plurality of switches connected to the circuits of the radio receiving apparatus; a master-control for said multiple switch and mounted on said panel; a hinged panel-cover; an operating linkage extending between said master control and the movable member of the multiple switch, said master-control including an operating device manually movable in one direction, when the panel-cover is open, operating the operating linkage putting the multiple switch in "on" position; said operating device extending to the exterior of the panel and lying operatively in the path of a portion of the panel-cover in its closing movement over the panel for operation of the operating device in another direction by the cover, operating the operating linkage and putting the multiple switch in its "off" position.

9. A switching arrangement for an encased radio direction-finder receiver comprising a casing housing said receiver, a door for a vertical wall of the casing and hinged thereto for outward swinging, a switch supported on the back of the hinged door and including a plurality of switches connected to the circuits of the electrical apparatus, the hinge of the door being at its lower portion; an operating panel located above the hinged door, the upper portion of the hinged door having an outward curvature on the upper portion of which said panel is supported in inclined position, and the upper portion of the panel being supported by an upper portion of the casing; a hinged panel-cover also supported by said upper portion of the upper curved portion of the hinged door on which the panel is supported; a master control mounted on the back of the panel; and an operating linkage extending from the master-control down across the junction of the panel and door and down to the multiple switch on the back of the hinged door; said master-control including an operating device manually movable in one direction, when the panel-cover is open, operating the operating linkage putting the multiple-switch in "on" position; said operating device extending to the exterior of the panel and lying operatively in the path of a portion of the panel-cover in its closing movement over the panel for operation of the operating device in another direction by the cover, operating the operating linkage and putting the multiple switch in "off" position.

10. A switching arrangement for radio-receiving apparatus comprising a casing housing said apparatus, said casing including a portion hinged for outward swinging from the rest of the casing; a master-switch supported on the back of the hinged portion and including a plurality of switches connected to the circuits of the electrical apparatus; a master-control for said switch also supported on another portion of the back of the hinged casing-portion; and an operating linkage extending generally parallel to the hinged portion and connecting said master-control with the movable member of said multiple master-switch.

11. A switching arrangement for encased radio-receiving apparatus comprising a casing housing said apparatus, said casing including a portion hinged for outward swinging; a circuit-controlling switch supported on the back of the hinged portion, an operating control for the switch supported on another portion of the hinged casing-portion; and an operating linkage extending along the back of said hinged portion from said switch-control to the switch; said switch including two insulating bases extending parallel to one another, to the hinged portion and in general alinement with said operating linkage, the first of said bases being the means by which the switch as a whole is supported on the hinged casing-portion, and the second of said insulating bases being the movable portion of the switch which is connected to said operating linkage; the first insulating base being formed with a transverse slot and the two bases being held in parallelism by means having freedom of motion in said slotted portion; two binding posts mounted on the first insulating base; two cooperating switch-contacts respectively supported by the two insulating bases; and a flexible electrical lead between the switch contact carried by the movable second base and one of the binding posts on the first insulating base; all whereby, when the hinged casing portion on which the first insulating base is mounted, has been swung away from the casing, the second base remains in operative relation to the first base for movement relative thereto by said operating linkage.

12. A switching arrangement for an encased radio direction-finder including radio receiving apparatus and a casing therefor, said casing including a vertical closure hinged at a lower portion to a lower portion of the casing and said closure having an upper portion supported by an upper portion of the casing; an electrical switch in rear of a lower portion of said closure and mounted on the closure; a control for said switch located in rear of an upper portion of said closure and mounted on the closure; said switch-control being connected mechanically to the movable member of the switch by means of an operating linkage extending down vertically in parallel with the vertical closure; said switch-control including a rocker on one side of the pivot of which said switch-operating linkage is connected; a second rocker having a connection to the first rocker on the other side of the pivot of the first, two push-buttons connected to the portions of the second rocker on opposite sides of its pivot, said buttons extending freely thru the hinged closure to the exterior thereof; and a cover for said upper portion of the hinged casing-portion, said cover being hinged to said casing-portion; one of said switch-buttons lying operatively in the path of a portion of said cover in the closing movement thereof; and said switch, switch-control and cover being movable with the hinged casing-portion when the latter is swung outwardly from the casing.

13. A switching arrangement for an encased radio direction-finder receiver comprising a casing therefor, said casing including a vertical closure hinged at a lower portion to a lower portion of the casing, the upper part of said closure including an operating panel having an upper portion supported on an upper portion of the casing; a switch located in rear of the lower portion of the hinged casing-portion, mounted thereon, and including a plurality of switches connected to the electrical circuits; a master-control for said switch located in rear of said operating panel, mounted thereon, and including a swinging member; and an operating linkage connected to said swinging member, extending downward to the movable member of said multiple switch and having a loose connection with said movable member; said panel-portion and lower portion of the hinged vertical closure being rigidly connected together, and all said parts being movable relative to the casing and outwardly thereof when said closure is moved on its hinge outwardly from the casing.

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